Defense Contract Management Command

DCMC Commanders Conference

Software Contract Administration Services Tutorial

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Software Concerns*

A Growing Concern

- **In 1995 85% of Software Projects Finished Over Time or Budget**
- **1/2 of Projects Double Cost Estimates**
- **Projects Slip an Average of 36 Months**
- **1/3 of Projects Cancelled**

Cusumano, Improving Software Engineering Practice, Patricia Sanders, Jan 1999

*Chart presented by Dr Etter, DUSD(S&T) to DoD Software Collaboration Workshop - 30 J

Software CAS Tutorial

Software CAS Tutorial
- M32A (60/20) Video
- Software CAS Chapter Basics
- Capability Maturity Model for Software

Software Center Integrated Plan:
- Software Performance Reviews
- CMM Based Insight
- SPD

Questions and Answers

Software CAS - Objectives

Goal

- Evaluate contractor's efforts
- Provide buying activity insight

By

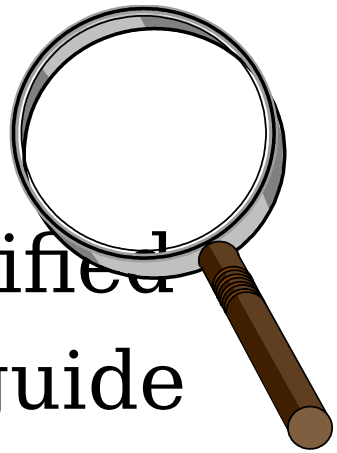
- Evaluating supplier's processes, plans, and procedures
- Using risk management principles

Software & Supplier Risk Mgmt

Planning

- Review Contract, Line Items, CDRLs and SOW
- Contractor Planning documents
  - Software Development Plan
  - Software Quality Plan
  - Software Risk Management Plan
- Program Documentation
  - MOA
  - Computer Resources Life Cycle Management Plan
  - Test and Evaluation Master Plan

Software & Supplier Risk Mgmt



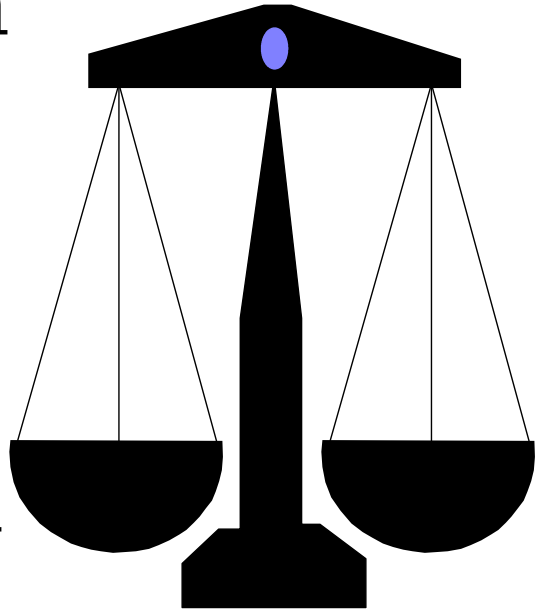
Risk Assessment

- Assess each key process identified
- Use Software Risk Matrix as guide
  - Performance (reqmt's, bad practices, personnel problems, tools)
  - Schedule (Variances, unfounded, unrealistic)
  - Cost (Variances, unfounded, unrealistic)

Software & Supplier Risk Mgmt

Risk Handling Plan

- Process Proofing
- Process Auditing
- Product Audits
- Data collection & analysis



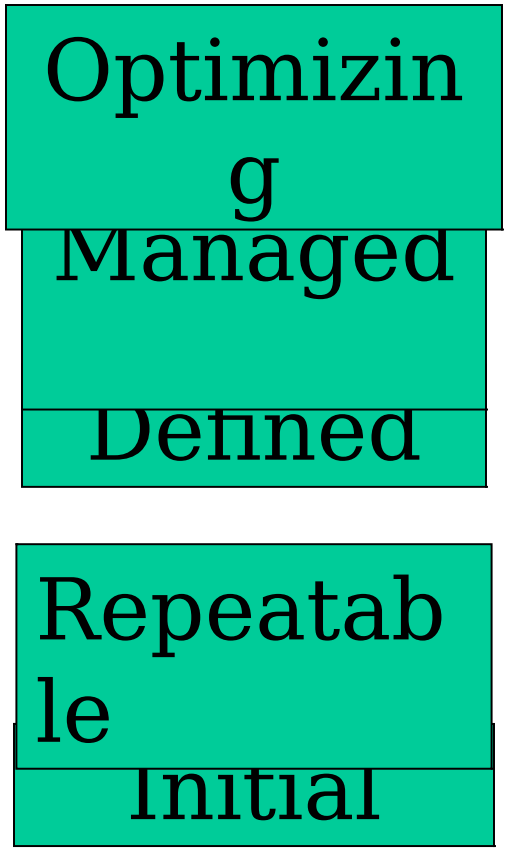
Software & Supplier Risk Mgmt

- Risk Monitoring
  - Execute the plan
  - Reevaluate risk periodically
  - Adjust activities accordingly
- Risk Documentation
  - SPECS
  - RAMP
  - DIRAMS

The Capability Maturity Model

- Basis for new DoD policy
- Industry recognized standard
- Software Development can be:
  - Controlled
  - Measured &
  - Improved

Process Maturity Levels



Process Control

Process Measurement

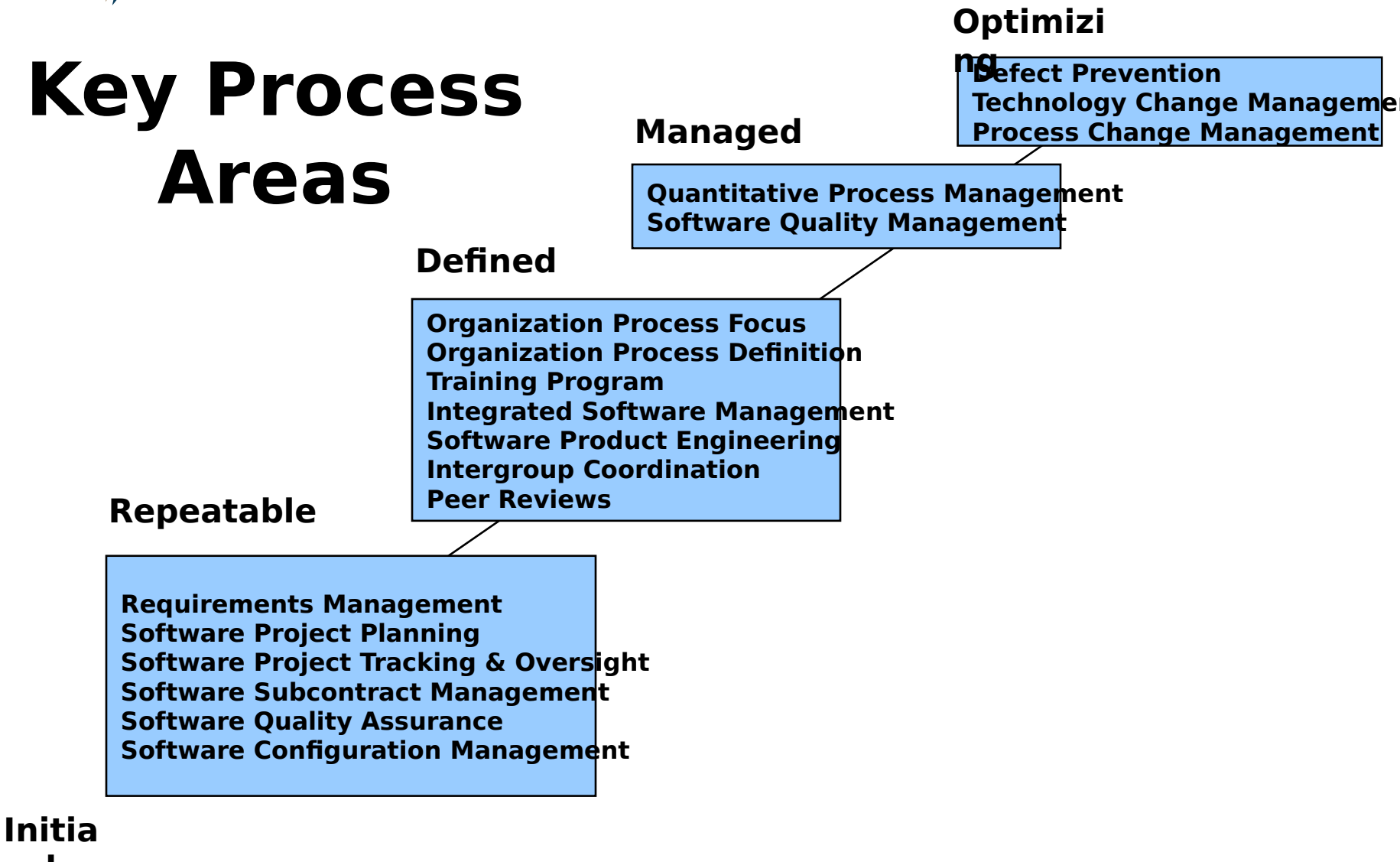
Process Definition

Basic Management Control

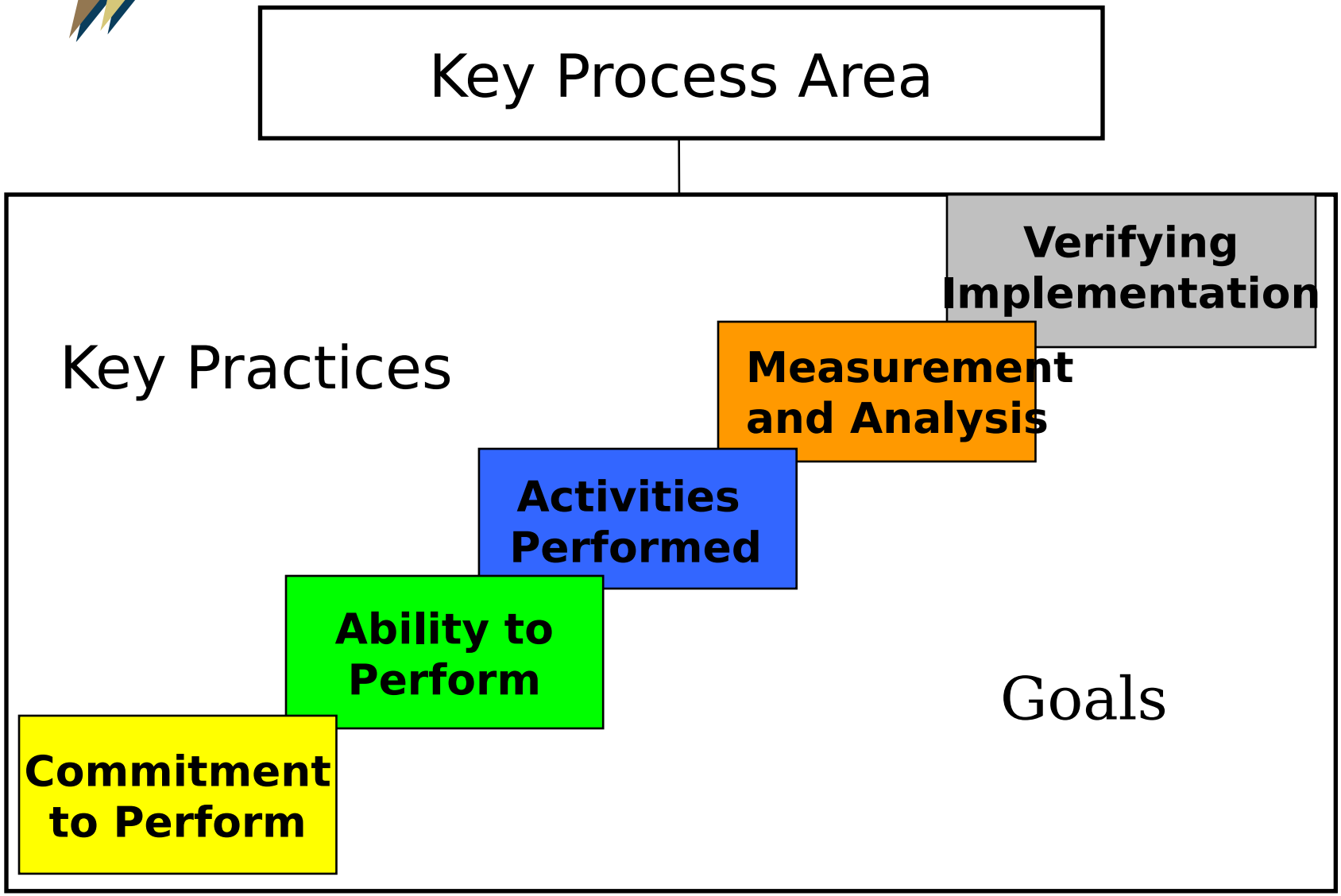
Ad Hoc Software Processes

The Software CMM

Key Process Areas



The Software CMM



New OSD Policy (Oct 26, 1999)

- Software Evaluations for ACAT 1 Programs
  - Use of SEI evaluation tools or equivalent
  - Assess business unit proposed to do work
  - Contractors not at Level 3
    - Develop a risk mitigation plan and schedule
    - Describe, in detail, actions to correct weaknesses
    - Plan needs Program Manager approval
  - Reuse of evaluation results encouraged
  - Equivalent will be defined by DUSD(S&T)
  - Policy will go into DoD 5000 rewrite

Why we are doing it.

.....The SEI SA-CMM should be used more effectively by DoD to measure performance.

Dr. Delores Etter, Deputy Under Secretary of Defense (Keynote Speaker STC 5/2/99)

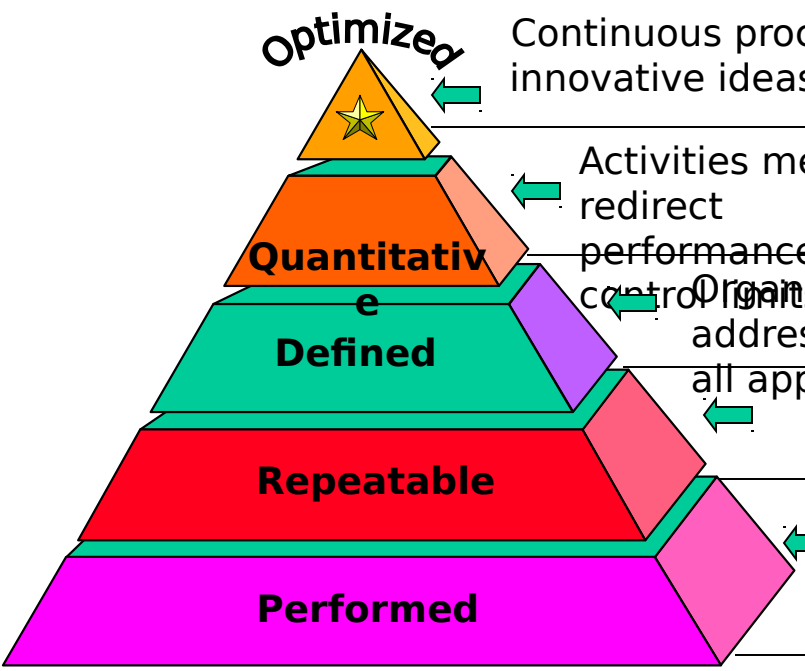
Software Performance Maturity Model

What is the Software Performance Maturity M

- Maturity model used to evaluate performance of Software CAS activities
- Based on the Software Acquisition Capability Maturity Model (SA-CMM)
- Process maturity framework to help DCMC improve their Software CAS process

Software Performance Maturity Model

Approach



Continuous process improvement activities in place - piloting of innovative ideas and technologies are attempted

Activities measured and analyzed - data provides ability to redirect performance. Adjustments made when process deviates from control limits

Organizational process established and documented addressing all applications - same process used across organization

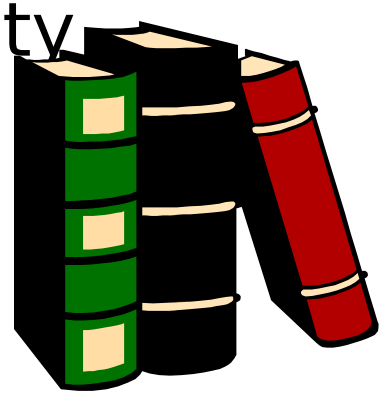
Process in place at lower levels - *Repeatable* results for specific application

Do any way to get the job done - process undefined, success based on individual effort

The DCMC model is tailored to our Mission from the Software Acquisition - Capability Maturity Model, which was developed by the Software Engineering Institute.

Software Performance Maturity Model

- Model is based on actual practice and incorporates DCMC best practice
- Review process based on government & industry accepted approach (Software CMM & Software Capability Evaluation - SCE)



Software Performance Maturity Model

One-Book Tracks to the Model

- **Software Development Surveillance Chapter covered 100%**
- **56% of the key practices have references to the One-Book**
- **A project goal is to enhance DCMC performance (One-Book) based upon DoD sponsored model (SEI Software Acquisition CMM)**

SPMM Goals

Determine the "health" of DCMC CAO activities in the area of Software CAS performance.

- **Allow a CAO Commander to identify an existing level of maturity and goals to improve upon S/W CAS activities**
- **Identify needs to adjust Command training, policy, and / or guidance**
- **Focus DCMC Software Center Assistance to CAOs**

Concept

- The SPMM project baselines CAO S/W CAS performance and allows the CAO Commander to determine the need for performance improvement

- All applicable One-Book requirements are included in the SPMM features

- Self-evaluation using the SPMM is effective in providing insight to potential IOA issues by the CAO

Software Performance Maturity Model

Project Events

- Project funded (Oct 98)
- Pilot locations selected by Districts (Nov 98)
- Pilot reviews performed (April 99)
- Pilot review results briefed (May 99)

➔ ***Performance reviews (Oct 99 - Mar 00)***

- Performance review results brief (April 00)

Pilot Test Approach

- Standardized method, and data collection tools
  - Involved team comprised of Software and EV Center, CAO, and Districts
- Two trained/experienced teams (5 each)
- 6 locations selected by Districts (E&W)
- Questionnaires provided in advance

Pilot Test Issues

Issues were discussed as they came up.

- SPR objective was not clearly understood
- Perception of added requirements imposed
  - Fear that CAO Commander will demand
    ultimate level (optimized)
  - Fear of a Command-wide performance level

What it is; what it isn't

- The Software Performance Review (SPR)
  is not an audit or assessment
- The SPR results are reported as observations, *NOT FINDINGS*
- The SPR observations are usable by the
  CAO as a performance improvement
  priority tool

Software Performance Review Tools

KPA Rating Sheets

	KPA : SOFTWARE CAS PLANNING					
					G1: Software CAS planning documents are prepared early and prior to supplier actions.	
					G2: Software CAS plans encompass all aspects of the acquisition processes as assigned.	
Questionnaire Reference		Met	Not Met	Part Met	N/A	NOTES
6-21	Co1					
	Ab1					
1,2,3-21	Ac1					
7-21	Ac2					
10-21	Ac3					
4,5-21	Ac4					
	Me1					
8-21	Ve1					
9,11-21	Ve2					

Software Performance Review Tools

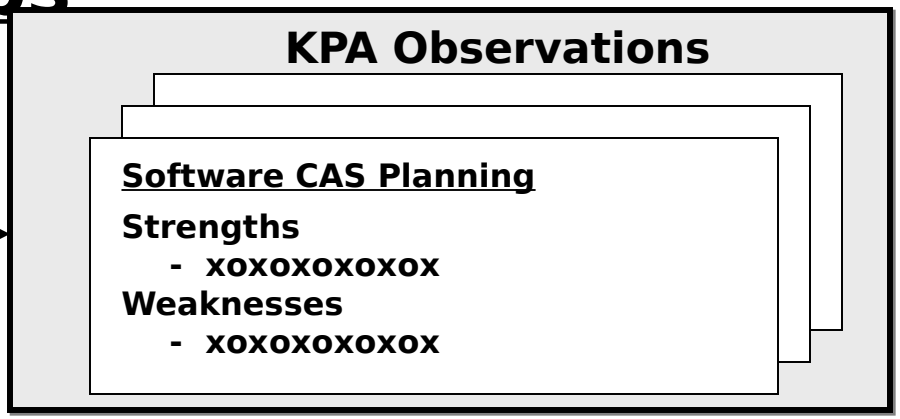
Review process steps

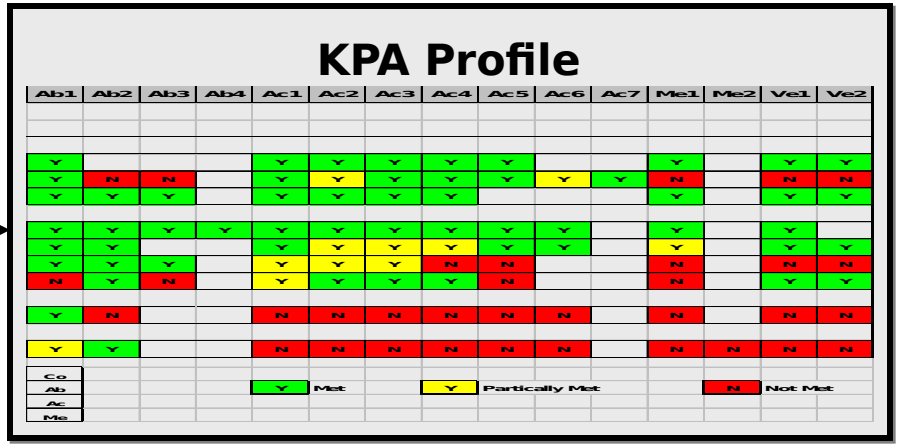
Training & Form Team

Questionnaire

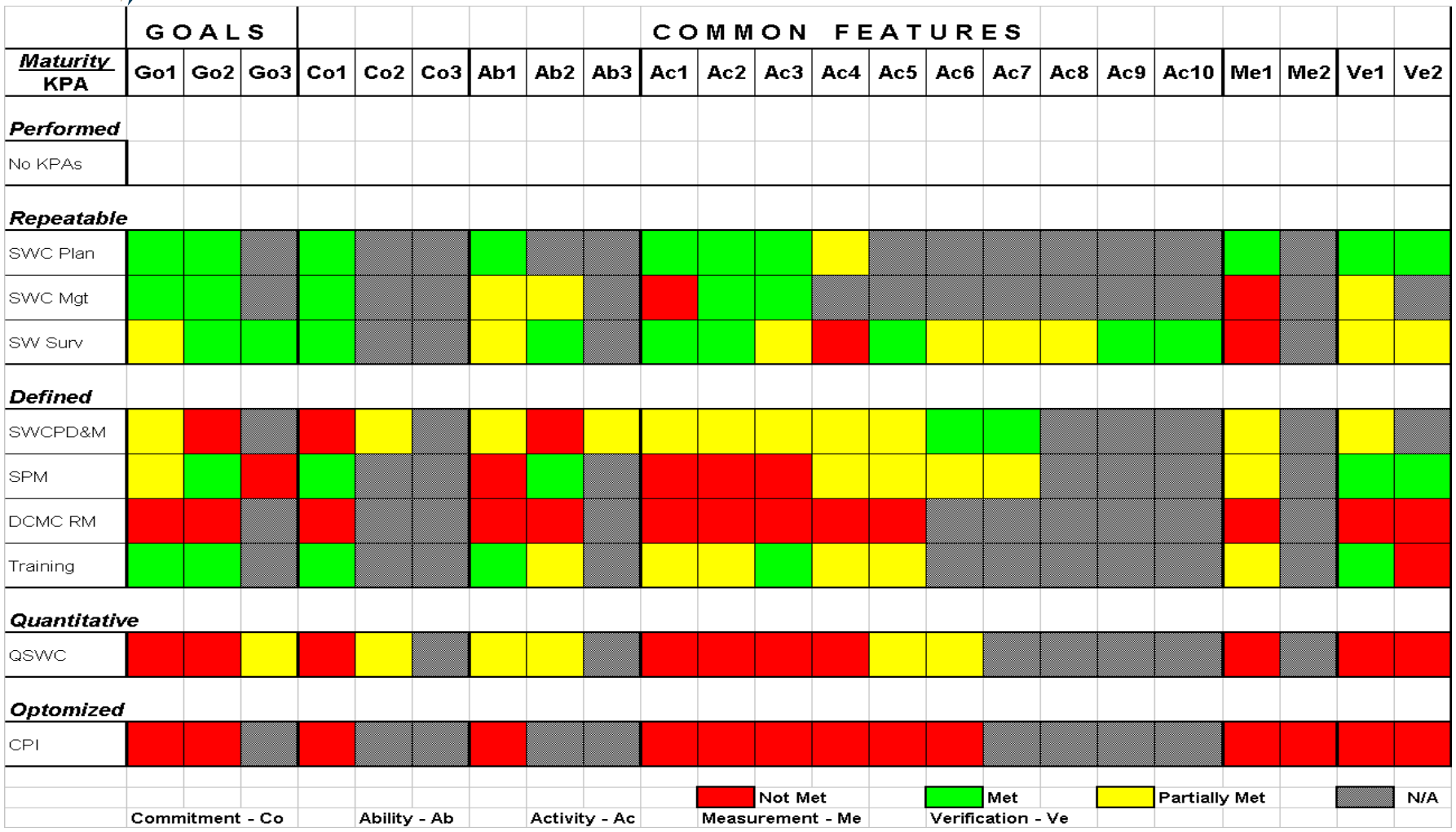
Collect Data
- Interviews
- Discussions
- Documentation Review

Analyze Data & Formulate Observations





Software Performance Maturity Model



Example of Result Reporting - "Tetris" Profile

Repeatable				**Defined**				**Quantitative**	**Optimized**
SW CAS Planning	SW CAS Mgmt	Supplier Tracking & Insight	Supplier Process & Product Evaluation	Process Definition & Maintenance	Supplier Performance Management	DCMC Risk Mgmt	Training		Continuous Process Improvem't
Co 1	Co 1	Co1	Co1	Co1	Co 1	Co 1	Co1	Co 1	Co 1
Co 2	Co 2	Co2	Co2	Co2	Ab 1	Co 2	Co2	Co2	Co 2
Ab 1	Ab 1	Ab 1	Ab 1	Co3	Ab 2	Ab 1	Ab 1	Ab 1	Co 3
Ac 1	Ab 2	Ab 2	Ab 2	Ab 1	Ac 1	Ab 2	Ab 2	Ab 2	Ab 1
Ac 2	Ab 3	Ab 3	Ab 3	Ab 2	Ac 2	Ab 3	Ab 3	Ac 1	Ab 2
Ac 3	Ab 4	Ac 1	Ac 1	Ab 3	Ac 3	Ac 1	Ac 1	Ac 2	Ac 1
Ac 4	Ac 1	Ac 2	Ac 2	Ab 4	Ac 4	Ac 2	Ac 2	Ac 3	Ac 2
Ac 5	Ac 2	Ac 3	Ac 3	Ac 1	Ac 5	Ac 3	Ac 3	Ac 4	Ac 3
Me 1	Ac 3	Ac 4	Ac 4	Ac 2	Ac 6	Ac 4	Ac 4	Ac 5	Ac 4
Ve 1	Me 1	80	Me 1	Ac 3	Me 1	Ac 5	Ac 5	Ac 6	Ac 5
Ve 2	Ve 1	Ac 6	Ve 1	Ac 4	Ve 1	Me 1	Me 1	Me 1	Ac 6
		Ac 7	Ve 2	Ac 5	Ve 2	Ve 1	Ve 1	Ve 1	Me 1
		Me 1		Ac 6		Ve 2	Ve 2	Ve 2	Me 2
		Ve 1		Me 1					Ve 1
		Ve 2		Ve 1					Ve 2
G1	G1	G1	G1	G1	G1	G1	G1	G1	G1
G2	G2	G2	G2	G2	G2	G2	G2	G2	G2
				G3	G3		G3	G3	G3
					G3				

Software Performance Maturity Model

XXI

CAO Results

	Key Process Area	Rating
Optimized	Software CAS Continuous Process Improvement	
Quantitative	Quantitative Software CAS	
Defined	Training	
	DCMC Risk Management	
	Supplier Performance Management	
	Software CAS Process Definition and Maintenance	
Repeatable	Software Surveillance	
	Software CAS Management	
	Software CAS Planning	

= KPA CRITERIA MET

= KPA CRITERIA PARTIALLY MET

= KPA CRITERIA NOT MET

Sample Observation

Software CAS Planning

The purpose of Software CAS Planning is to ensure that all reasonable planning for the Software Acquisition is conducted and that all elements of the project are included.

STRENGTHS

Software Surveillance Plans in place and have been distributed.

WEAKNESSES

No CAO Software Facility Plan or strategy is currently in place.

No measurements are currently being made by management of the Software CAS Planning activities.

No single CAO process in place for contract review, Government rights, or Government Furnished Equipment.

CAO management demonstrates a minimal level of awareness of the use of SPECS as a resource estimating tool for Software CAS activities.

Pilot Results

KPA SATISFACTION PROFILE

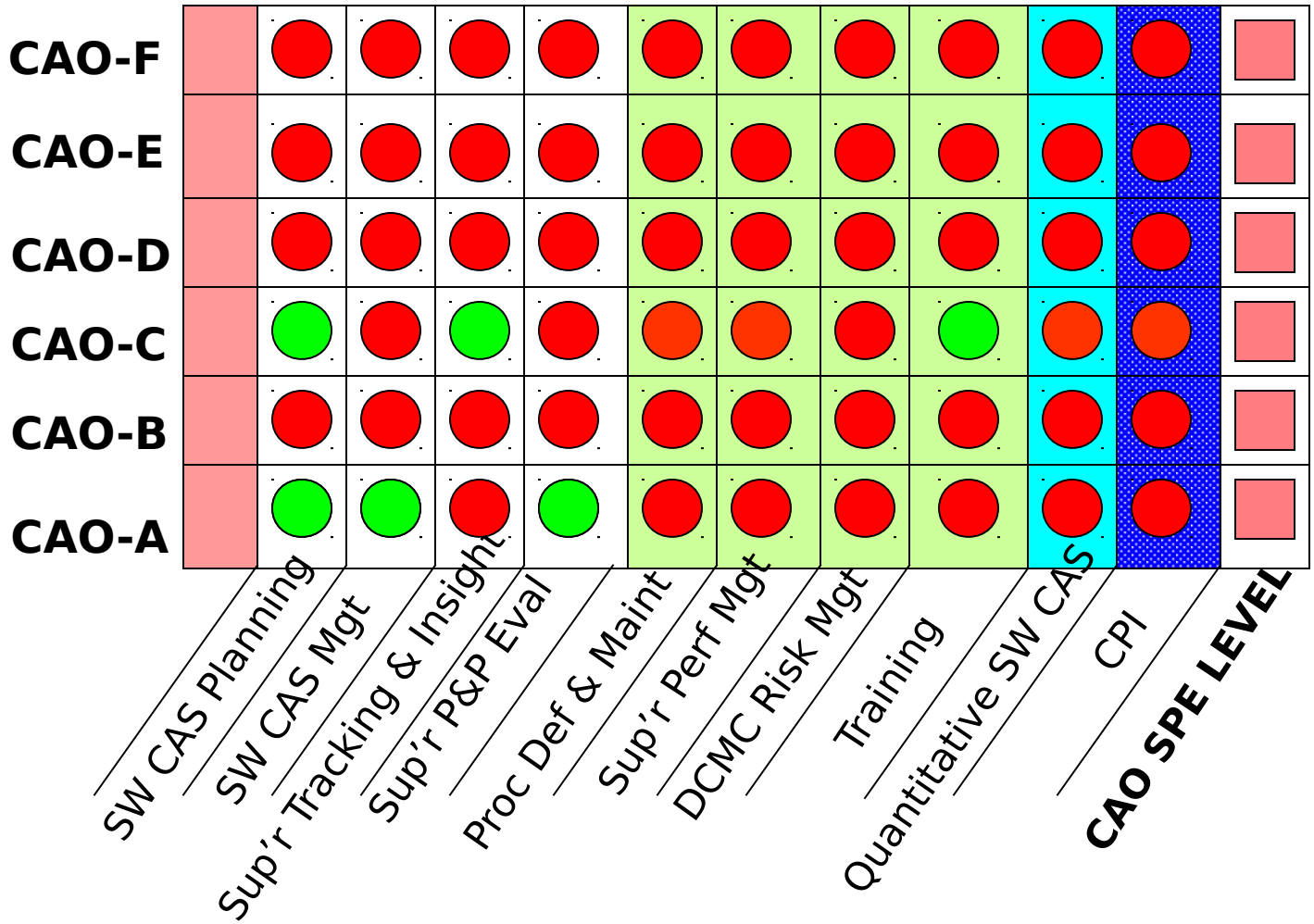
KPA RATING

= KPA CRITERIA MET

= KPA CRITERIA NOT MET

LEVEL RATING

- Performed
- Repeatable
- Defined
- Quantitative
- Optimized



CMM Based Insight

Surveillance Strategy + Risk Management + Industry Recognized Standard = Process Related Information

- Activities Mapped to SW CMM
- Observations Generated and Classified
  - Strengths & Weaknesses identified
  - Key process assessment performed
- Pilot underway, implementation target: July 2000

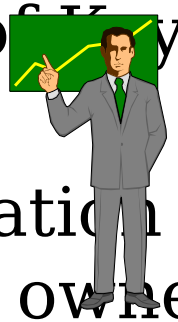
CMM Based Insight

Rolls and Responsibilities:

- All Software Professionals will make observations
- A trained analyst will determine if higher level components of CMM are achieved

Level III Update

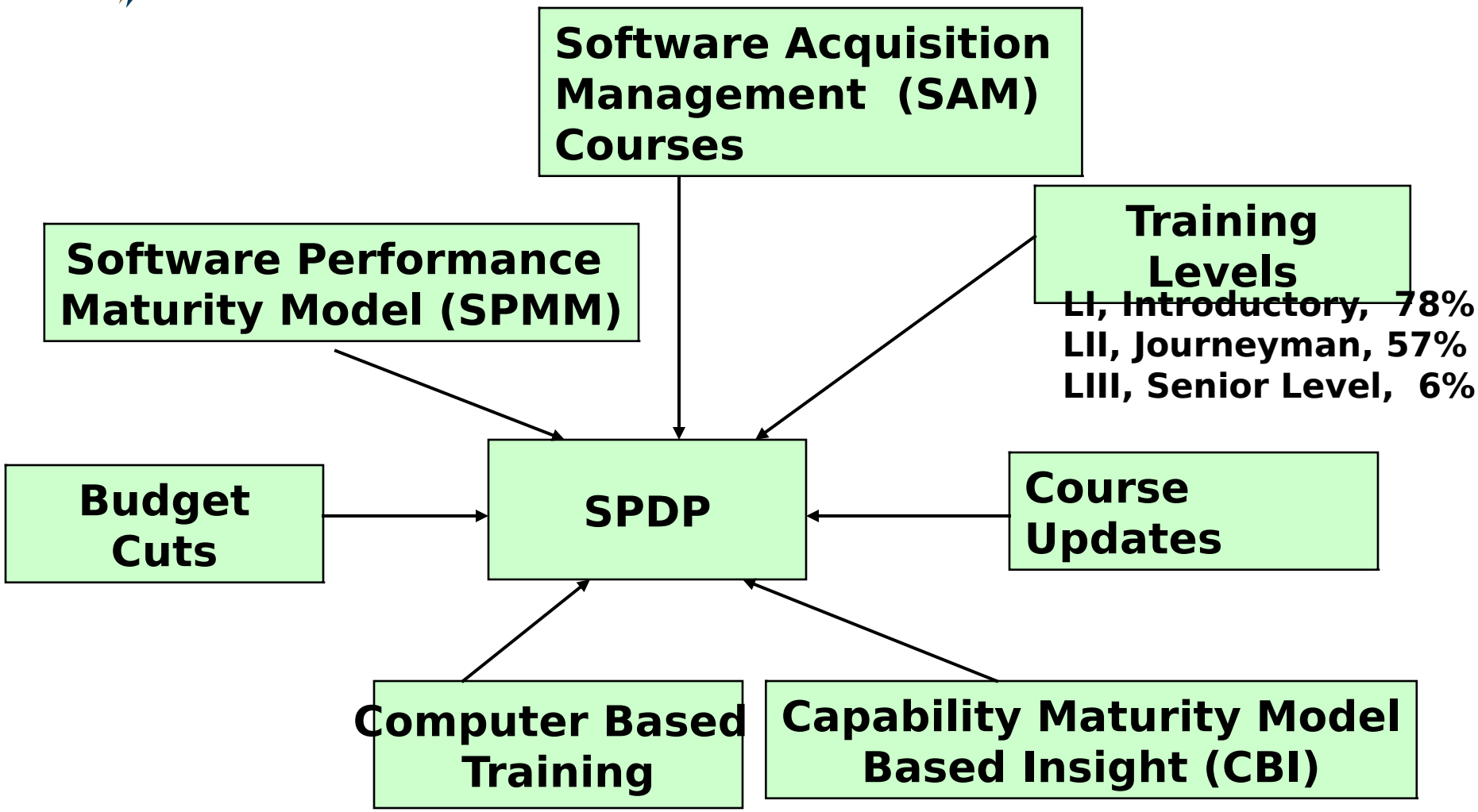
- **Level III: CMM Based Insight (CBI) Analyst**
  - Purpose
    - Facilitate the implementation of CBI at respective CAO
    - Analyze data to determine health of Key Process Areas
    - Coordinate process related information with contractors software process owners



Level III Update

- **Level III: CMM Based Insight (CBI) Analyst** (continued)
  - Requirements
    - Currently certified Level II or III
    - Seven or more years experience in software development related activities
      - At least two years of DoD Software CAS
  - Training
    - Software Capability Evaluation (SCE) version 3
    - CMM Based Insight Analyst Course

Software Professional Development Program



SPDP Transition Plan

SPDP CBT Transition Plan for Existing Level II Candidates	
Previous Requirement	New Requirement
ADA	C++ Programming Language Track
System Analysis and Design (SXX)	System Analysis Fundamentals
	Data Flow Diagram
	Entity Relationship Diagrams
	Data Dictionary
Software Surveillance Application Mentoring	Software CAS Application Mentoring
Software Surveillance Application (SSA)	Software CAS Application
Software Surveillance Evaluation Mentoring	Software CAS Evaluation Mentoring
Software Surveillance Evaluation (SSE)	Software CAS Evaluation
Capability Maturity Model (CMM)	Capability Maturity Model (CMM)

SPDP Training Curriculum

SPDP Mandatory Tracks for Certification

Software Surveillance Fundamentals Track	Source
Basic Software Acquisition Management (BSAM)	CBT
C Programming Language Track	CBT
Microsoft Windows Architecture: Fundamentals	CBT
Microsoft Windows Architecture: Advanced	CBT
Microprocessor Fundamentals	? (upgrade class)
Software Surveillance Fundamentals Mentoring	OJT
Software Surveillance Fundamentals (SSF)	Classroom

Level I

Software Surveillance Application Track	Source
Systems Analysis Fundamentals	CBT
Data Flow Diagrams	CBT
Entity Relationship Diagrams	CBT
Data Dictionaries	CBT
Database Fundamentals	CBT
Software Surveillance Application Mentoring	OJT
Software Surveillance Applications (SSA)	Classroom

Level II

SPDP Training Curriculum

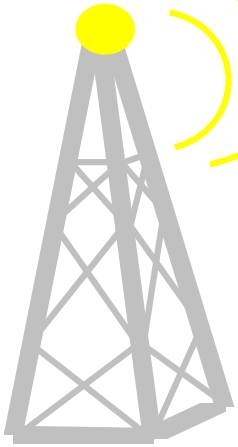
SPDP Mandatory Tracks for Certification (continued)

Software Surveillance Evaluation Track	Source
Principles of Object-Oriented Programming: I	CBT
Principles of Object-Oriented Programming: II	CBT
Object-Oriented Analysis: Objects & Classes	CBT
Object-Oriented Analysis: Dynamic Modeling	CBT
Object-Oriented Design	CBT
C++ Programming Language Track	CBT
Project Management: Fundamentals	CBT
CMM	Classroom
Software Surveillance Evaluation Mentoring	OJT
Software Surveillance Evaluation (SSE)	Classroom

Level II

Deployment

- SPDP Training Guide
  - Currently being updated to reflect changes in training program
- Computer Based Training
  - Now Available
    - http://maestro.den.disa.mil/dlacbt/Default4.asp
- Software Training Matrices
  - In development



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Summary

DCMC Software CAS is moving in the right direction

- In step with OSD policy
  - CMM Based Insight
  - Increased emphasis on risk management
- Improving as an organization
  - Software Performance Maturity Model and Software Performance Reviews
  - SPDP Update